



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Ivan V. MENDENHALL  
Robert D. TAYLOR

Serial No.: 10/704,499

Filing Date: 07 November 2003

Title: BURN RATE ENHANCEMENT  
VIA METAL AMINOTETRAZOLE  
HYDROXIDES

Customer No.: 45483

Group No.: 1755

Examiner:  
Aileen Baker Felton

DECLARATION OF DR. IVAN V. MENDENHALL

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Declarant, Dr. Ivan V. Mendenhall, declares as follows:

1. I am a joint inventor of the subject matter described and claimed in the above-identified patent application.

2. I have a Doctorate degree in Food Chemistry and a Bachelor of Science degree in Chemistry, each from Utah State University.

I hereby certify that this correspondence (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service as First Class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on

11 May 2009

11 May 2009

Date

Signature

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3. I have more than seventeen years of work experience, including more than four years experience as an Analytical Chemist and more than thirteen years experience as a Formulation Chemist, studying gas generating formulations in the field of energetic materials, including the study of copper compounds and chemistry and the use of copper compounds in gas generating formulations.

4. I am presently the Senior Specialist of Formulation Chemistry for Autoliv ASP, Inc., a corporation duly organized and existing under and by virtue of the laws of the State of Indiana and having a principal office and place of business at 3350 Airport Road, Ogden, Utah 84405.

5. I have read and reviewed the Office Action dated as mailed 11 February 2009 ("Office Action") and the outstanding prior art rejections of the pending claims appearing therein.

6. I have read and reviewed:

a. United States Patent Application Publication US 2004/0159381 A to Kubo et al., including its specification and claims and which publication is identified in the Office Action as an English-language equivalent to cited and applied WO 02085817 to Kubo et al.; and

b. cited and applied U.S. Patent 6,143,102 to Mendenhall et al., including its specification and claims.

7. I am one of the joint inventors of the subject matter described and claimed in U.S. Patent 6,143,102 to Mendenhall et al. and am closely familiar with the disclosure therein contained.

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8. In the Office Action,

a. Claims 39-51 were rejected as being unpatentable over WO02085817 to Kubo et al. The Office Action asserts:

Kubo et al discloses slurry mixing of oxidizer such as copper hydroxide and fuel such as 5-aminotetrazole and subsequently heated (para. 0012, 0028, 0055, and 0081). The mixture is then added to other components of gas generating compositions (para. 0095 and 0096).

The Office Action further asserts:

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the claimed compounds present in the composition since they will form upon reaction of two compounds that are combined in a slurry and then added to the composition.

b. Claims 54-59, 61-66 and 69-72 were rejected as being unpatentable over WO02085817 to Kubo et al. as applied to claims 39-51 above, and further in view of Mendenhall et al. (6143102). The Office Action asserts:

Mendenhall teaches a gas generating composition that comprises BCN and GN. (col.4)

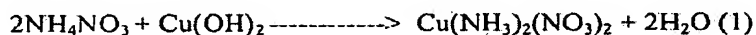
9. Based on my years of experience in working with copper compounds and the use of copper compounds in gas generating formulations, the slurry mixing of oxidizer such as copper hydroxide and fuel such as 5-aminotetrazole, as set forth in the Office Action as disclosed in US 2004/0159381 A to Kubo et al., does not result in the formation of metal aminotetrazole hydroxides, particularly copper aminotetrazole hydroxides, in accordance with the invention.

10. A stated object of US 2004/0159381 A to Kubo et al. is to provide a phase stabilized ammonium nitrate-containing oxidizing agent. [See para. 0009.]

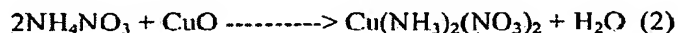
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11. Based on my years of experience in working with copper compounds and the use of copper compounds in gas generating formulations, in the mixing 5-aminotetrazole in the presence of a copper-containing oxidizer such as copper hydroxide and a stoichiometric excess of ammonium nitrate, as described in US 2004/0159381 A to Kubo et al., the high affinity of copper for ammonia would cause the preferential formation of a copper ammine complex preventing the formation of copper aminotetrazole hydroxide.

a. When the copper-containing oxidizer is copper hydroxide, the reaction with ammonium nitrate is shown as follows:



b. When the copper-containing oxidizer is copper oxide, the reaction with ammonium nitrate is shown as follows:



Consequently, metal aminotetrazole hydroxide and, more specifically, copper aminotetrazole hydroxide, particularly,  $\text{Cu}(\text{CH}_2\text{N}_5)\text{OH}$  are/is not formed in or during processing in the presence of ammonium nitrate, as disclosed in US 2004/0159381 A to Kubo et al.

12. Based on my years of experience in working with copper compounds and the use of copper compounds in gas generating formulations, the proposed combining of the gas generating composition of Mendenhall that comprises BCN and GN with gas generating composition processing of US 2004/0159381 A to Kubo et al.

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does not result in the formation or presence of metal aminotetrazole hydroxide and, more specifically, copper aminotetrazole hydroxide, particularly,  $\text{Cu}(\text{CH}_2\text{N}_5)\text{OH}$ .

#### CONCLUSION

13. The slurry mixing of oxidizer such as copper hydroxide and fuel such as 5-aminotetrazole, as set forth in the Office Action as disclosed in US 2004/0159381 A to Kubo et al., does not result in the formation of metal aminotetrazole hydroxides, particularly copper aminotetrazole hydroxides, in accordance with the subject patent application.

14. All statements made herein of my knowledge are true; all statements made on information and belief are believed to be true; and I make these statements with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Ivan V. Mendenhall  
Dr. Ivan V. Mendenhall

May 6, 2009  
Date

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